MasterScope Invariant Analyzer Ver1.6
Release Memo

August 2017
NEC Corporation

Thank you for choosing our products. This document describes features and usage of the MasterScope Invariant Analyzer you are going to use.

CONTENTS

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1. Product Description

1.1. Product Details

MasterScope Invariant Analyzer automatically models and analyzes performance information obtained from monitoring a system and detects a failure (or a silent failure) that has occurred within the system without anyone noticing it. It can contribute to reducing the many hours and much labor consumed in the past to identify the causes of such failures and take measures against them.
Hereinafter Invariant Analyzer will be described as IA capability.

1.2. System Architecture

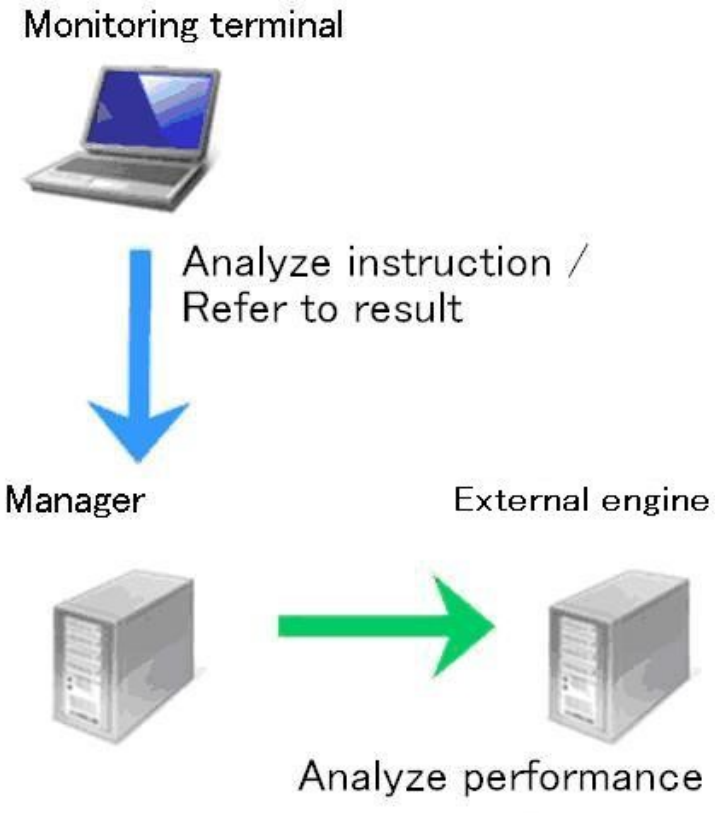

figure 1-1 Invariant Analyzer System Architecture

- Monitoring terminal
  Direct performing analysis to Manager and view the result.

- Manager
  Accumulating performance data collected from MasterScope SystemManager, generate a model by extracting invariant relationship from normal system performance data. Based on the model generated, analyze performance data and detect failures.

- External engine
  To offload manager's workload, you can put external engine capability on the other machine . External engine performs high cost modeling and analysis process.

If external engine is not used, Manager will do the same process.

1.3. About the Manual

The manual for this product is stored in chm format in the Media.
\doc\Inva\Invariant_Analyzer.chm

It also can be referenced from a monitoring window after the product(s) has been installed.

1.4. Installation media

This product is installed from MasterScope Media (DVD-ROM media).

2. System Environment

2.1. List of Supported Platforms

OS Name(*1)	Manager Function	Console Function	External Engine Function
Windows Server 2008 (SP1, SP2) (32bit)	√	√	√
Windows Server 2008 (SP1, SP2) (x64)	√	√	√
Windows Server 2008 (SP1, SP2) (Itanium)	-	-	-
Windows Server 2008 R2 (without SP, SP1)	√	√	√
Windows Server 2012 (x64)	√	√	√
Windows Server 2012 R2 (x64)	√	√	√
Windows Server 2016 (*3)	√	√	√
Windows 7 (without SP, SP1) (32bit) (*2)	Not Support	√	Not Support
Windows 7 (without SP, SP1) (x64) (*2)	Not Support	√	Not Support
Windows 8 (32bit) (*2)	Not Support	√	Not Support
Windows 8 (x64) (*2)	Not Support	√	Not Support
Windows 8.1 (32bit) (*2)	Not Support	√	Not Support
Windows 8.1 (x64) (*2)	Not Support	√	Not Support
Windows 10 (32bit) (*2)	Not Support	√	Not Support
Windows 10 (x64) (*2)	Not Support	√	Not Support
Red Hat Enterprise Linux 5.6, 5.7, 5.8, 5.9, 5.10, 5.11 (x86)	√	Not Support	√
Red Hat Enterprise Linux 5.6, 5.7, 5.8, 5.9, 5.10, 5.11 (x86_64)	√	Not Support	√
Red Hat Enterprise Linux 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9 (x86)	√	Not Support	√
Red Hat Enterprise Linux 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9(x86_64)	√	Not Support	√
Red Hat Enterprise Linux 7.1, 7.2, 7.3, 7.4 (x86_64)	√	Not Support	√
Red Hat Enterprise Linux 7.4, 7.5 (x86_64)	Not Support	Not Support	Not Support
Oracle Linux 6.2, 6.4 (UEK) (x86_64)	√	Not Support	√

(*1) Only English version is supported.

(*2) The supported editions are as follows:

Windows 7 Professional, Enterprise, Ultimate

Windows 8 Pro, Enterprise

Windows 8.1 Pro, Enterprise

Windows 10 Pro, Education, Enterprise

(*3) Windows Server Core and Nano Server are not supported.

2.2. System Requirements

■ Windows Manager / External engine / Console

Item		Description
CPU	Manager function	Intel dual core Xeon or later, or any compatible equivalent processor (64bit CPU(x64) is recommended.)
	Console function	Intel Core2Duo or later, or any compatible equivalent processor
	External engine function	Intel Dual Core Xeon or later, or any compatible equivalent processor (64bit CPU(x64) is recommended.)
System Memory	Manager function	1GB or more (2GB or more is recommended)
	External engine function	1GB or more (2GB or more is recommended)
	Console function	1GB or more (2GB or more is recommended)
Disk (free size) (Note 1)	Manager function	200MB or more
	External engine function	100MB or more
	Console function	100MB or more
Network		100Mbps LAN or higher
OS(Note 2) (Note 6)	Manager function External engine function	Please refer to 2.1 List of Supported Platforms (x64 Edition is recommended.)
	Console function	
	External engine function	
Required Software	Manager function External engine function	None
	Console function (When using Web Monitoring View)	Internet Explorer 9, 10, 11(Note 5)

■ Linux Manager / External engine

Item		Description
CPU	Manager function	Intel dual core Xeon or later, or any compatible equivalent processor (64bit CPU(x64) is recommended.)
	External engine function	Intel Dual Core Xeon or later, or any compatible equivalent processor (64bit CPU(x64) is recommended.)
System Memory	Manager function	1GB or more (2GB or more is recommended)
	External engine function	1GB or more (2GB or more is recommended)

Disk (free size) (Note 1)	Manager function	200MB or more
	External engine function	100MB or more
Network		100Mbps LAN or higher
OS(Note 4)	Manager function External engine function	Please refer to 2.1 List of Supported Platforms
	External engine function	
Required Software	Manager function External engine function (Red Hat Enterprise Linux 5)	Package: compat-libstdc++-33 (32bit) Package: libgcc (32bit) Package: e2fsprogs-libs (32bit) Package: ncompress or gzip Package: glibc (32bit) Package: procps Package: ncurses (32bit) For a 64-bit environment, you need the following packages in addition to 32-bit versions of the packages: Package：libgcc (64bit version) Package：glibc (64bit version) Package：libstdc++ (64bit version)
	Manager function External engine function (Red Hat Enterprise Linux 6, Oracle Linux 6)	Package: compat-libstdc++-33 (32bit) Package: libgcc (32bit) Package: libuuid (32bit) Package: ncompress or gzip Package: glibc (32bit) Package: procps Package: ncurses(32bit) For a 64-bit environment, you need the following packages in addition to 32-bit versions of the packages: Package：libgcc (64bit version) Package：glibc (64bit version) Package：libstdc++ (64bit version)

	Manager function External engine function (Red Hat Enterprise Linux 7)	Package: compat-libstdc++-33 (32bit) (Note 3) Package: libgcc (32bit) Package: libuuid (32bit) Package: ncompress or gzip Package: glibc (32bit) Package: ncurses-libs (32bit) Linux common (64bit environment): For a 64bit environment, you need the following packages in addition to 32bit versions of the packages: Package: libgcc (64bit) Package : glibc (64bit)Package : libstdc++ (64bit)

Note) For the required software, packages required to be installed additionally based on the minimum OS configuration installation are described.

(Note 1) This does not include areas such as those for data files to be created after the installation of the products.

(Note 2) Windows Server Core and Nano Server are not supported.

(Note 3) This package is not included in an installation media of RHEL 7 (ISO image). Download it at the customer portal of Red Hat, Inc. (https://access.redhat.com)

(Note 4) When using Linux, disable SELinux in advance. Note that SELinux is enabled by default in Red Hat Enterprise Linux 6

(Note 5) Restrictions are applied when using Web Monitoring View. For details, see the “MasterScope Media Release Memo”.

(Note 6) It's incompatible with a tablet mode of Windows 10.

3. What's New in this Release

This section outlines new features and enhances functions.

3.1. Increase in supported platforms

Red Hat Enterprise Linux 7.2 and Windows Server 2016 are now supported.

3.2. Enhancement of map view

The [Back] button, [Previous] button, [Upper] button, [Top] button, and [Each tree] menu have been added to the map view.

3.3. Enhancement of commands

3.3.1. BusinessCmd

An option is added to the BusinessCmd LIST command to display the category monitoring state (ACTIVE/HOLD).

For details, see the following chapters in the manual or in Help.
[Command Reference]
-[BusinessCmd]
-[BusinessCmd LIST]

3.3.2. Addition of command to disconnect the definition mode console

A command is added to disconnect the definition mode console connected to the manager.
For details, see the following chapters in the manual or in Help.

4. Improvements

This version contains the modifications for Invariant Analyzer as described in Table 1. Note that √ indicates the improved functions.

Table 1 Modification details

Item No	Description (contents ID on the NEC support portal)	Function applied								
		Console function	Manager function			Agent function				
			Windows	HP-UX	Linux	Windows	HP-UX	Solaris	AIX	Linux
1	● Business view Corrected the problem where the screen may not be scrolled even when a new message is generated if messages are checked in other consoles on the message list screen in the business view.	√								

5. How to Install or uninstall the product

For information on how to install and uninstall this product, refer to the MasterScope Media release memo (relmemo.pdf).

To install the manager and external engine in the Windows x64 Edition environment, the runtime components of the Visual C++ 2010 library need to be installed in advance.
Obtain and install the “Microsoft Visual C++ 2010 Redistributable Package (x64)” from the Microsoft website or the following path on the WebSAM Media.

(When the DVD-ROM drive is E drive)
E:\tools\Microsoft\2010\vcredist_x64\vcredist_x64.exe

6. How to upgrade the product

The version of this product is upgraded by an overwrite installation of its new version.
For information on how to perform an overwrite installation of the product, refer to the "MasterScope Media release memo" (relmemo.pdf).

* Ensure that you will upgrade the version of the manager and external engine and monitoring console. When the version differ, it is not guaranteed that the agent can be connected to the manager.

7. Configuring external engine environment

This section describes how to configure external engine environment.
Both Invariant Analyzer Manager and monitoring console should be installed prior to this step, and the IA capability is already activated by registering its license.

7.1. Installing external engine

Install MasterScope InvariantAnalyzer RelayManager with MasterScope Media(DVD-ROM media).
For more detail of installation and uninstallation of this product, please refer to 「MasterScope Media releasememo」(relmemo.pdf)
Please refer the following for setup after installation.

7.1.1. Install configuration(Windows)

At the installer window, when MasterScope InvariantAnalyzer RelayManager is chosen to install, the following window is displayed.

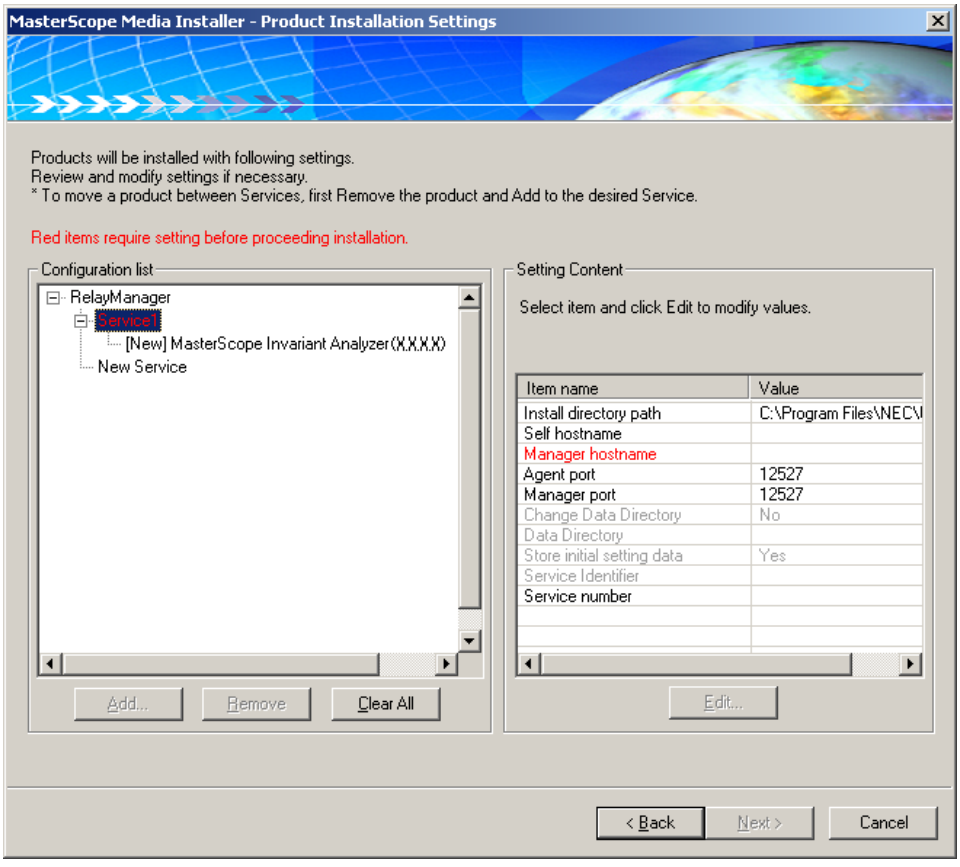

figure 7-1 RelayManager installation window(Windows)

When RelayManager related services at the configuration list tree, configurable items are displayed at the Setting content frame. Referring the following, please setup it.

■Self hostname (optional)
Configure the name of external engine.
When installing on the machine on which the manager is installed, be sure not to use the same name as the host name of the manager.

■Manager hostname
Configure the host name or IP address of manager to connect.

■Agent port
This is not used in this product.
However external engine will use this port number.
Please specify one of the available port number on the external engine machine.

■Manager port
Specify the port number to connect to the Manager.
The port number should be the same of the “Agent port” of the manager configured.

After installation, external engine will startup automatically. When external engine has connected to the manager, the message like 「Connected external engine.(ENGINE=<hostname of external engine>)」 is generated. Refer to the monitoring console.

7.1.2. Install configuration(Linux)

When the installation process has been started, the window similar to the following is displayed.

```
----------------------
Installation settings
----------------------
 RelayManager
        1 Service1
                1.1     MasterScope Invariant Analyzer RelayManager X.X.X.X
        2 New Service

--------------------------------------------------------------------------------
(*) marked products or services require specific settings before installation.
--------------------------------------------------------------------------------
Please select operation to perform from following commands.
[Example: 's1' configures settings for first service listed above.]
(r[n.n]:remove v[n]:view c:clear b:back e:execute q:quit program):
```

figure 7-2 RelayManager installation window(Linux)

When the 's' and number of the service of RelayManager is input in a configuration list, configurable items are displayed. Referring the following, please setup it.

■Self hostname (optional)
Configure the name of external engine.

■Manager hostname
Configure the host name or IP address of manager to connect.

■Agent port
This is not used in this product.
However external engine will use this port number.
Please specify one of the available port number on the external engine machine.

■Manager port
Specify the port number to connect to the Manager.
The port number should be the same of the “Agent port” of the manager configured.

After installation, external engine will startup automatically. When external engine has connected to the manager, the message like 「Connected external engine.(ENGINE=<hostname of external engine>)」 is generated. Refer to the monitoring console.

7.2. Configuration from monitoring console

At the option, open invariant analysis tab and then go to analysis engine setting.
Check on the ”Use external analysis engine server” at the Analysis engine settings window.
Select the check box for [Use external analysis engine server.] in the [Analysis engine setting] dialog box, and then press the [Add] button.

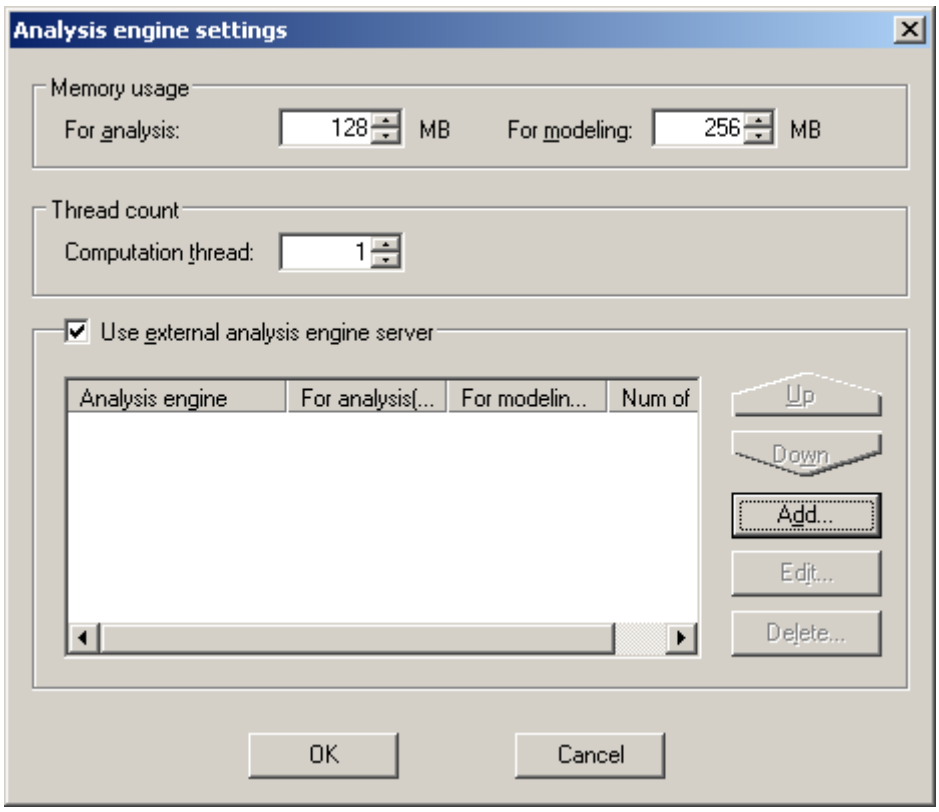

figure 7-3 Analysis engine settings window

When you click the [Add] button, the [Analysis engine setting] dialog box is displayed.

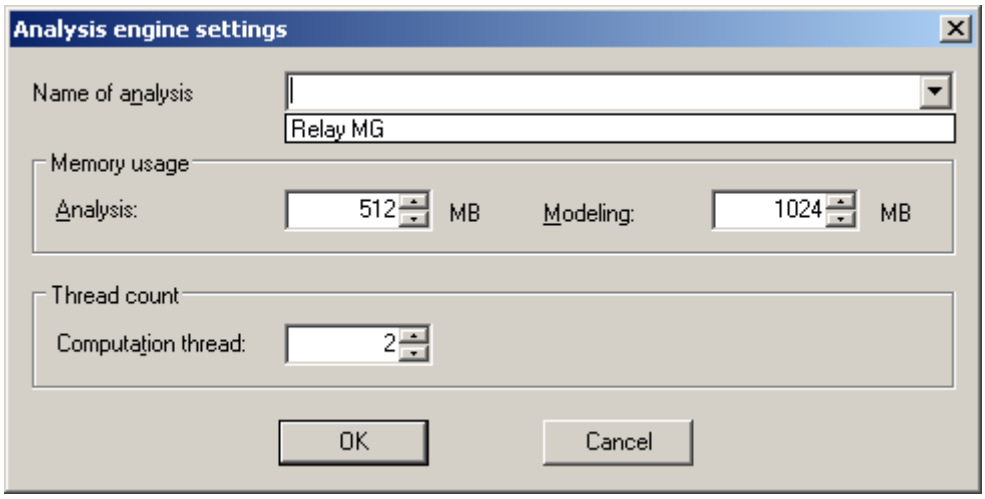

figure 7-4 Analysis engine add/edit window

In the host name list, the list of the external engines available is displayed. If you will not see new external engine, please make sure the external engine is configured exactly and started up already.

For more detail of this window, please refer to the manual

8. Note

8.1. Registering a license

This product verifies the license agreement using the license management function.The product can be used with a trial version license for three months after installation and can be used with an application period license for a month after a license key was registered; however, an official license needs to be registered to use the product after this period.Use the following procedure to register an official license:

1) Register a license key to obtain a code word application code.
2) Refer to the attached documentation and obtain a code word.
3) Register the code word.
4) Restart the manager.

Restart the manager as soon as the code word is registered.

The number of licenses for the trial version is described below.

License name	Number of licenses	Remarks
MasterScope Invariant Analyzer for Win/Linux	1	Manager, external engine, monitoring terminal, basic license (including 5,000 counters)

8.2. Startup user of console

Start the console as a user with administrative authority for the operating system.
Users without administrative authority cannot start the console.

8.3. About connection between different versions

Versions of Manager, external engine and monitoring console should be the same exactly.
When you upgrade the products, please keep each version at the same time.

8.4. About logical items name in the integrated topology

In you put the characters“\” or “|” in logical items names in the integrated topology, the performance data in those logical items are not analyzed.
Please do not put “\” or “|” in logical items names.

8.5. When using Web Monitoring View

If a runtime error occurs when using the IA function in an environment where Web Monitoring View is used, upgrade gdiplus.dll in that environment to the latest version.
You can upgrade gdiplus.dll by downloading “Platform SDK Redistributable: GDI+” from the Microsoft Web site.

8.6. Installing a product on Linux

Disable SELinux when installing the product on Linux.

8.7. User account control for Windows Vista and later versions

Note the following when using the product in a Windows Vista or later version environment in which user account control is enabled
A user account control warning dialog “[A program needs your permission to continue]” is displayed when starting the console.Select [Continue] to start the console.This warning dialog cannot be suppressed in an environment in which user account control is enabled.
%ProgramFiles% folder is located in the virtual memory.Editing the SysMonSvc.ini file must be performed with an editor with administrator authority when a folder under Program Files is selected as the installation location

8.8. About Outputting Core Files when a Failure Occurs in a UNIX environment

Invariant Analyzer Ver 1.4.1 or later is configured to output core files as follows to make examinations faster when a failure occurs.

■ Destination for core file output

- Manager
  <Installation path>/Manager
- External engine
  <Installation path>/RelayManager

■ Maximum size of core files
No limit.

If there is any problem with the above setting, edit the following file accordingly.

- Files to be edited
  Manager (Linux)
  /etc/init.d/InvariantAnalyzerManager_1

  External engine (Linux)
  /etc/init.d/InvariantAnalyzerRelayManager_1

- What to be edited
  The above files include the following statement.
  ulimit -c unlimited
  Change this portion of “unlimited” to your desired maximum file size.

Note that you should pay attention to the following points.
*When upgrading the version of a product, the edited files may be overwritten; if that is the case, those files must be edited again.
*If you specify any other value than unlimited for the size of the core files, the core files may become imperfect. If that is the case, we may ask you to sample the core files again after specifying “unlimited” as the maximum file size.
*As any output core file is assigned to a process ID and the file is not overwritten in Linux, there may be impact on the disk capacity when failures continue to occur on the product in a row.

8.9. When Using Red Hat Linux AS/ES 4.0

If you are using Red Hat Linux AS/ES 4.0, some versions of libraries provided with the OS may cause memory leaks due to bugs.

[Problematic libraries]
glibc-2.3.4-2.19
glibc-common-2.3.4-2.19
glibc-utils-2.3.4-2.19

To avoid this problem, get updates of the packages from the following URL, and restart the machine after installing them.

[Red Hat Support]
https://rhn.redhat.com/errata/RHBA-2006-0510.html

8.10. Character encoding when outputting a file

It is recommended to specify UNICODE for the character string when outputting a file by using the file output function of the console, manager, or agent function.
When a file is output by using other than UNICODE character encoding, characters that cannot be expressed by using the specified character encoding might be output as different characters.

8.11. On-access virus scan

If the folders used by MCOperations are subject to an on-access virus scan, MCOperations might not function normally. For this reason, exclude the folders (installation folder/data area folder) used by MCOperations as the target of the on-access scan.

8.12. On-access virus scan

If the folders used by MCOperations are subject to an on-access virus scan, MCOperations might not function normally. For this reason, exclude the folders (installation folder/data area folder) used by MCOperations as the target of the on-access scan.

8.13. Notes on Uninstallation

Delete the following directories before uninstalling the product when patches have been applied.

- UNIX
  <Installation Path>/<Function>/patch/
  Example:
  For manager:
  <Manager Installation Path>/Manager/patch/

- Windows
  <Installation Path>\Patch\<Path Name>\<Function Name>
  (Multiple deletions are required when multiple patches have been applied.)
  Example:
  For manager:
  <Manager Installation Path>\Patch\NECfw234\Agent

Reapply the patches when the product is reinstalled.

8.14. Changing the directory mount point used within the product

The mount points cannot be assigned separately for each directory in the directory pointed by the installation path of the product.

8.15. Imported Performance Data

The size of a performance data is 16 bytes.
A file of performance data is created each day.
Example: Amount of data when 100 counters are monitored at a 30-second interval and the data is retained for 7 days.
Amount of data saved in one file: 16 bytes * 3,600 seconds * 24 hours / 30 seconds = 46,080 bytes
Disk size used for one file: 49,152 bytes (when the block size is 4 KB)
100 counters for 7 days (700 files): 49,152 bytes × 700 = 34,406,400 (Approx. 32.9MB）
* The numbers above are for reference only and the actual results vary depending on the operating conditions.

The expected number of inodes used for accumulating the performance data for the UNIX manager is shown below

Number of monitoring counters * (number of days in the retention period + 4)

Example: For 30,000 counters for 30 days, 1,020,000 inodes are used.

When storing the performance data of several tens of thousands of counters, be sure to secure sufficient area for the inodes when configuring the file system.

The performance data is saved in the following directory.

Windows: <manager installation directory>\Manager\sg\PerfManager
UNIX: <manager installation directory>/Manager/sg/PerfManager

8.16. Maximum number of counters that can be managed by the performance management function

The performance management function can manage up to 1,000,000 counters. Counters exceeding 1,000,000 cannot be registered.

The following functions register counters to the performance management function.

・ Invariant Analyzer function (Importing performance data by using a monitoring terminal and command)

A counter can be deleted by using the following methods.

・ Invariant Analyzer function
Delete the counter from the counter information window.

For details, see the following chapters in the manual or in Help.
[Performing invariant analysis]
-[Maintaining counter information]
-[Maintaining counter information]

A counter can also be deleted by deleting a logical item from the integrated topology view. In this case, delete all logical items with the same host name.

8.17. Upper limit for the number of counters

If model generation or analysis is performed on a lot of counters, the memory usage of the process exceeds the limitation, causing the process to fail.
The estimated maximum number of target counters is 200,000.

The upper limit depends on parameters (a time period for the target performance data and its sampling interval) at the time of model generation and analysis, model's effective correlation, and the number of abnormal correlations detected. It should absolutely be treated as an approximate number.

If your environment has more than 10,000 counters, please take the following precautions:

- Use an external engine.
  You can install an external engine in the same machine on which the manager is running.
- Use a machine with ample physical memory (4 GB or more) installed.
- When using Windows as the platform for the manager and an external engine, use a 64-bit OS and perform the following steps:

  1. Stop the manager and the external engine.
  2. Rename respective SysMonMgr.exe files to SysMonMgr32.exe in the following directories:

     Manager: <Install_Path>/Manager/bin
     External engine: <Install_Path>/RelayManager/bin

  3. Rename respective SysMonMgr64.exe files to SysMonMgr.exe in the same directories.
  4. Start the manager and the external engine.

- To use Linux for the manager and external engine, use a 64-bit operating system.

8.18. Notes on reinstallation

When the manager function of this product is reinstalled, it is necessary to apply for a code word again.
Reapplying for a code word is not required for cases other than reinstallation.
When data is restored from a backup after reinstallation, it is also necessary to apply for a code word again.

9. Restrictions

9.1. Installing a product on Linux

When using the Linux manager, specify 50,000 or less for the total number of counters to be analyzed. The maximum number of counters that can be used varies depending on the configuration and performance of the computer on which the manager is installed. Use this number as a guideline.

9.2. Context menu in the display

If one of the following operations is executed, the item at which the mouse cursor is pointing might become the target of the operation of the context menu.

Conditions

- If the context menu is opened on an unselected item while the SHIFT or CTRL key is being held down in a list in which multiple items can be selected.
- If the context menu is opened on an unselected item in a list that is updated automatically.

Target dialog boxes

The target dialog boxes are as follows:

- Analysis result list dialog box
- Model list dialog box
- Analysis result related information dialog box
- Category message dialog box
- Category message search result dialog box

10. Remarks

10.1. Restarting Invariant Analyzer

This section describes how to restart Invariant Analyzer manually

Restarting manager(Windows)

When you want to restart manager manually, please restart Windows service which is named "MasterScope Invariant Analyzer Manager_1"

Restarting external engine(Windows)

When you want to restart manager manually, please restart Windows service which is named "MasterScope Invariant Analyzer RelayManager_1"

Restarting manager(Linux)
When you want to restart manager manually, please carry out below.

- OS of which system is controlled by init
  # sh /etc/init.d/InvariantAnalyzerManager_1 stop↵
  # sh /etc/init.d/InvariantAnalyzerManager_1 start↵

- OS of which system is controlled by systemd (e.g. Red Hat Enterprise Linux 7.1)
  # systemctl stop InvariantAnalyzerManager_1↵
  # systemctl start InvariantAnalyzerManager_1↵

*When init is used in Linux, the process name (the second field) in /proc/1/stat is init. When systemd is used, the process name (the second field) in /proc/1/stat is systemd.

Restarting external engine(Linux)
When you want to restart manager manually, please carry out below.

- OS of which system is controlled by init
  # sh /etc/init.d/InvariantAnalyzerRelayManager_1 stop ↵
  # sh /etc/init.d/InvariantAnalyzerRelayManager_1 start↵

- OS of which system is controlled by systemd (e.g. Red Hat Enterprise Linux 7.1)
  # systemctl stop InvariantAnalyzerRelayManager _1↵
  # systemctl start InvariantAnalyzerRelayManager _1↵

*When init is used in Linux, the process name (the second field) in /proc/1/stat is init. When systemd is used, the process name (the second field) in /proc/1/stat is systemd.

*For the Linux, execute with an account that has root authority.
*By other MasterScope products installed, if the same name of services or rc scripts are installed , the name of those services will end with more than 2. (For example: MasterScope Invariant Analyzer Manager_2, MasterScope Invariant Analyzer Manager_3）

10.2. Default account (login name)

After installing, default system administrator account is created as “Administrator”.
In the first time to log in, please use the following information.

Login name: Administrator
Password : websam

*Please change Administrator’s password.

10.3. List of communication ports

WebSAM Invariant Analyzer uses the network ports shown below. To operate WebSAM Invariant Analyzer normally, change the firewall settings to enable communication through the network ports shown below.

Communication name	Sender	Port	Direction	Receiver	Port	Remarks
Manager-external engine communication	External engine	ANY/TCP (*1)	→	Manager	12527/TCP	● Specify a value that is not used from 1000 to 32767. ● Alterable (See the manual (help).)
Manager-console communication	Console	ANY/TCP (*1)	→	Manager	12528/TCP	● Specify a value that is not used from 1000 to 32767. ● Alterable (See the manual (help).)
Manager-Webconsole communication	Webconsole	ANY/TCP (*1)		Manager	8080/TCP	● Specify a value that is not used from 1000 to 32767. ● Alterable (See the manual (help).)
Used within an manager	Manager	ANY/TCP (*1)	→	Manager	12521/TCP	Used by the command in this product.

*1 ANY indicates a port number between 1024 and 65535.